

WHAT IS CLAIMED IS:

1. A perforated tray without downcomer provided with a plurality of holes, wherein

each of the plurality of holes has a diameter  $d$  in a range of from 10mm to 25mm,

each of the plurality of holes is separated from an adjacent hole by a center-to-center distance in a range of from  $1.2d$  to  $3d$ ,

the perforated tray without downcomer has a thickness in a range of from 2mm to 8mm, and

the perforated tray without downcomer has an opening ratio in a range of from 10% to 30%.

2. The perforated tray without downcomer as defined in claim 1, wherein

the perforated tray without downcomer has a flat surface, and

each of the plurality of holes has an edge fabricated into a round surface at least either on an upper side of the edge or on a lower side of the edge.

3. A perforated tray without downcomer provided with a plurality of holes, wherein

each of the plurality of holes is separated from an adjacent hole by a center-to-center distance in a range

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of from  $1.2d$  to  $3d$ ,

4. A perforated tray tower without downcomer, comprising a plurality of perforated trays without downcomer disposed respectively at a plurality of stages, each of the plurality of perforated trays without downcomer being provided with a plurality of holes, wherein

each of the plurality of holes has a diameter  $d$  in a range of from 10mm to 25mm,

the perforated tray without downcomer has a thickness in a range of from 2mm to 8mm,

the perforated tray without downcomer has an opening ratio in a range of from 10% to 30%, and

each of the plurality of holes is separated from an adjacent hole by a center-to-center distance in a range of from  $1.2d$  to  $3d$ ,

wherein, if one or more of the plurality of perforated trays without downcomer are used at the same stage, the two most closely located holes that respectively belong to adjacent perforated trays are separated from one another by a center-to-center distance in a range of from 50mm to 150mm.

5. The perforated tray tower without downcomer as